

more, the bismuth content of Mastertool® film is significantly lower than the silver content of silver film. Combined with the fact that Mastertool® film has a longer lifetime than silver film, this results in the relatively low contribution to resource depletion for Mastertool® film.

As was mentioned above, low quality data were used in this study for the production of bismuth, for the production of photographic chemicals and for the waste treatment of used Mastertool® film. The results show however that the use of better data would not change the general conclusions of the study. Indeed, the differences between the environmental impacts of silver film and Mastertool® film over their entire lifecycles are so substantial, that the environmental impacts should have been over- or underestimated by at least a factor 3 before the conclusions of the comparison would be reversed. It is highly unlikely that the assessment is that inaccurate, because the processes for which low quality data were used, do not have a dominant contribution to the environmental impacts of the entire lifecycles. For processes which do have a dominant contribution (film production, exposure and processing), high quality, primary data were used. Therefore, it is concluded that the data quality was sufficient in order to reach the goal of the study.

### 3 Conclusions

This paper presents the results of a comparative LCA between two photographic films that are used as phototools in the printed circuit board industry: a conventional silver film and a new Mastertool® film that allows dry phototooling. During the development of Mastertool®, it was intuitively felt that Mastertool® would have ecological advantages compared to

silver film, because no photographic chemicals are needed and no silver containing waste is produced in the printed circuit board production. The comparative LCA confirmed that this is indeed an environmental advantage. It also revealed that the improved technical characteristics of Mastertool®, more specifically its reduced susceptibility to mechanical damages (tear and wear) and its better dimensional stability, which result in an increased lifetime, are at least as important when it comes to reducing the environmental impact of phototools used in the production of printed circuit boards. It took a lifecycle approach to prevent this aspect to be overlooked.

### 4 References

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Received: June 24th, 1997

Accepted: November 6th, 1997

## News & Views

### The Nordic Council's Large Nature and Environmental Prize 1997

The prize was granted to the entrepreneur of the EDIP-Method (Environmental Design of Industrial Products), that is **The Institute for Product Development (IPU)**, Technical University of Denmark.

This was decided at a meeting in Oslo on 18 September 1997. The prize of 350.000 Dkr was presented at the Nordic Council's session in Helsinki on 12 November, 1997.

The IPU was suggested as award winner because of the institute's leading role in the EDIP-programme. During this programme, methods for **Environmental Assessment of Products** and for **Environmentally Design of Products** were developed. The methodology will be supported by a **Unit Process Data Base** and a **pc-tool** which is still under

preparation in a beta version. The methodology is thoroughly tested by five industrial companies and well documented in publications available both in Danish and English. The individual steps of the life cycle assessment have been made operationable through the creation of a collection of tools allowing for environmental assessment of new products in the design and development stages, and thereby enabling the environmental consequences of a product to enter into the decision making in the same way as other traditional commercial parameters.

The programme has already contributed to environmental improvements in a large number of complex industrial products. The companies **Bang & Olufsen**, **Danfoss**, **Gram**, **Grundfos** and **KEW Industry** have

profited from the programme when using the methodology in product development.

The Institute for Product Development has thus provided a significant contribution to solve the theoretical and practical challenge which both the Nordic countries and the rest of the world are facing to reduce the environmental impacts from consumption of products to ensure a sustainable development.

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